

Article



CARTOSAT – 1

The Latest from the Indian Remote Sensing Satellite Series

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Cartosat-1 is a state-of-the-art remote sensing satellite built by the Indian Space Research Organisation mainly intended for cartographic applications. It is the eleventh satellite to be built in the Indian Remote Sensing (IRS) satellite series. Weighing 1560kg at lift-off, Cartosat-1 was successfully launched into a 618km circular-polar Sun Synchronous Orbit (SSO) by the indigenously built polar satellite launch vehicle (PSLV) on May 5, 2005 from the Satish Dhawan Space Centre, Sriharikota, India at 0445 hrs

(GMT). Cartosat-1 carries two state-of-the-art Panchromatic (PAN) cameras that take black and white stereoscopic images of the earth in the visible region of the electromagnetic spectrum. The swath covered by these high resolution PAN cameras is 30km and their spatial resolution is 2.5 meters. The cameras are mounted on the satellite in such a way that near simultaneous imaging of the same area from two different angles $+26^\circ$ and -5° is possible. This facilitates the generation of accurate three-dimen-



Figure 1: Part of Kiev, Ukraine obtained on May 19, 2005 using Fore Camera.



Figure 2: Part of Khed brahma, Gujarat, India (Merged product of Cartosat-1 PAN Aft 08 May 2005 & Resourcesat-1 LISS IV MX 24 Mar 2004).

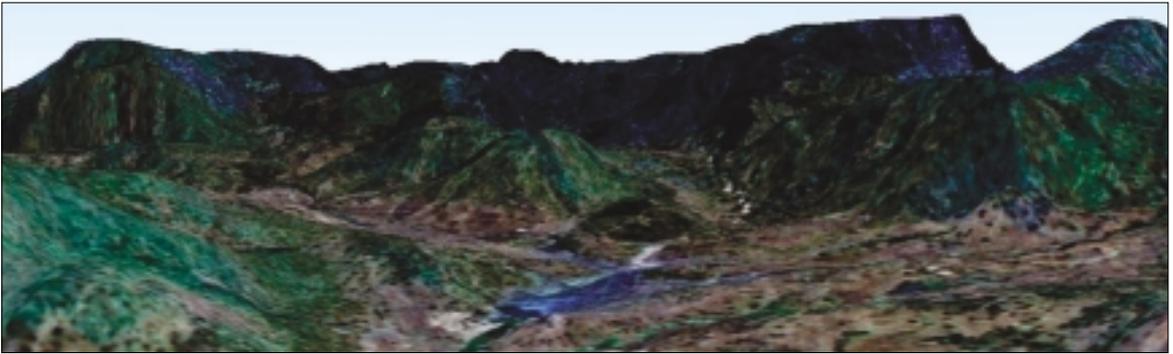


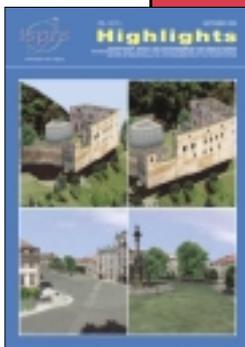
Figure 3: 3D Perspective view of Khed Brahma, Gujarat, India.

sional maps. The cameras are steerable across the direction of the satellite's movement to facilitate the imaging of an area more frequently. The images taken by Cartosat-1 cameras are compressed, encrypted, formatted and transmitted to the ground stations. The images are reconstructed from the data received at the ground stations. Cartosat-1 also carries a Solid State Recorder with a capacity of 120 Giga Bits to store the images taken by its cameras. The stored images can be transmitted when the satellite comes within the visibility zone of a ground station.

The radiometric resolution is 10 bit and swath in stereo mode is 30km and 55km in mono wide mode. The data rate requirement for 2.5m resolution is 340 MBPS for 10 bit quantisation. The high bit rate data is compressed by 3.2:1 JPEG compression technique to bring down the data rate to 105 MBPS compatible to X-band transmission. Ground control point library for India has been established to facilitate generation of precision corrected high location accuracy products. It is planned to supply both mono and stereo data based on the area of interest, for a minimum area of 25km x 25km. For all Cartosat-1 products, WGS-84 datum would be the default option. For large scale products, it is planned to

have cassini projection. The user order processing system would facilitate in data browsing, selection and order from the user site. It is also planned to supply digital elevation model products using the stereoscopic images of Cartosat-1. Precision geo-referenced products would be available in 1:25,000 scale (7.5min/ 14km) to 1:5,000 scale (2.25min / 4km). Merged products would be generated using Resourcesat-1 LISS IV MX data and Cartosat-1 data.

The Indian Remote Sensing satellites form an important element of the National Natural Resources Management System of the country and CARTOSAT-1 is the latest addition and fills the gap pertaining to elevation information. The data from Cartosat-1 is expected to provide enhanced inputs for updating/generation of topographic maps, large scale mapping applications and stimulate newer applications in the urban and rural area planning, land and water resources management, disaster monitoring and mitigation, environment impact assessment and various other applications in the area of geoinformatics. Initial images obtained from the Cartosat-1 are given in Figures 1, 2 and 3. For more details and additional images, you may logon to www.nrsa.gov.in or www.isro.gov.in.



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